Bottom-up Reuse Guidelines: Virtual Globes

Bottom-up Reuse Guidelines: (Re)use of Virtual Globes for the Earth Sciences

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Based on the presentation, "(Re)use of Virtual Globes for the Earth Sciences", by Ross Swick, to the NASA 5th Joint Earth Science Data System Working Groups Meeting, Software Reuse Working Group Breakout Session, University of Maryland, Adelphi, MD, November 14, 2006.

What are Virtual Globes?

A virtual globe is a computer software that simulates a globe. Some of the more well known packages include:

- Norkart Virtual Globe
- World Wind
- EarthSLOT
- Google Earth
- MS Virtual Earth
- TerrainView Globe

There were quite a few before Google Earth, and more coming every day. But Google has the PR machine behind it and has proven the most popular, so our examples will use Google Earth.

Advantages of Virtual Globes:

- **Ubiquitousness:** They're everywhere!
- **Ease of Use:** User's seem to like them, and putting data into them is fairly simple.
- **Cost:** Generally Free.
- **Feature rich:** Someone else has already supplied coastlines, railroads, Stuckey's etc.
- **Community:** Everybody is doing it - which means your data can be combined with everyone else's - Interdisciplinary Research!!!
- **Neato-ness:** They're neato!

Examples:

A few examples of the kinds of things you can do.

1) The image below shows our Near real-time Ice and Snow Extent (NISE) product in Google Earth. It gives daily ice and snow extent. We create a googleable image every day, so the user's google earth always has the latest image.

Along the West coast of Canada and southern Alaska you can see a bunch of pushpins – these are glaciers.

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2) Below are locations of glaciers for which we have historic photos on-line. Users can use Google Earth to navigate to their favorite glacier. Clicking on a pushpin brings up a thumbnail image. Full res images are available on the website which is linked.

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3) This is our monthly sea ice extent product. We have 28 years of data. This is a flipbook animation that refreshes with the next month in the series every three seconds. You can see the date in the upper left corner – this is the sea ice for May 2002. About a week after I wrote this Google came out with animation support in v4.02.

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4) This example is the same thing (monthly sea ice extent) except it is animated using Google's nifty time series capability. The little widget at the top of the image allows control over the animation. Click the arrow to animate/pause. The window expands/contracts to show more/less data at once. Other controls are accessed using the button on the left of the timeline.

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5) Another nice use for animation is quick-look browse. We have an interface that subsets gridded data. We figured as long as we're at it we may as well create some browse images so users can take a look at the data before they download it. Animating the browse in Google Earth just gives users a bit more flexibility.

Another thing you can do – that may or may not be a good thing – is you can fuss with the opacity. So here we have 19H, 22V, 37V, 85H, and 85V data for the same area and all the same dates. We could make one channel 50% opaque, put it on top of another channel, and animate them both. Could be interesting.

Or instead of greyshades we could use color. Make different channels shades of red, green, or blue, then combine them using different

opacity levels. Kind of a quick and dirty simulation of pixel algebra. In fact it's easy enough to do that we might just make three images of every channel (shades of red, green, or blue) and let the user combine them as they wish.

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6) And one last example – this is my favorite. My officemate is in charge of the Antarctic Glaciological Data Center. He is not a programmer, not even remotely. He paid $20.00 for Google Earth pro and used it to put his data catalog into Google Earth. It took him about a half a day. So he's got geographic search of his entire data catalog for 20 bucks and half a days labor.

AND … His program manager loves it!!!

Implications to Reuse:

You too can have:

- A nifty data visualization tool.
- A neato quicklook browse capability.
- A cool time series animator.
- A interactive geographic data catalog search.

By this time tomorrow!!!!

To view the examples shown within Google Earth download the KML files from our Website. Some files are available on our Virtual Globes home page. More experimental files are available from our Technical Experiments page.